BROWNFIELD DEVELOPMENT: A COMPARISON OF NORTH AMERICAN AND BRITISH APPROACHES

Accepted version of paper published in Urban Studies (2010), 47 (1), 75-104 .

Published version available at: doi.org/10.1177/0042098009346868

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Abstract

Over the past 30 to 40 years, urban change and deindustrialisation in advanced economies have created a legacy of vacant and derelict land that is increasingly seen as a development opportunity rather than planning problem. This paper investigates how the shared challenge of bringing such brownfield sites back into productive use has been interpreted differently in four countries: the United States, Canada, Scotland and England. In each case, the particular policy environment has shaped the brownfield debate in distinctive ways, producing a different set of relations between the public and private sectors in brownfield redevelopment. Through this detailed comparison of the North American and British experience, the paper traces the maturity of policy and seeks to discover whether the main differences in understanding and tackling brownfield land can be attributed primarily to physical, cultural or institutional factors.

Keywords

Brownfield development, policy maturity, urban regeneration, land use change, urban land policy

INTRODUCTION

Over the past 20 years, the term 'brownfield' has become an important focus for urban policy on both sides of the Atlantic. Yet, the shared challenge of bringing brownfield land back into productive use has been matched by confusion in meaning, inconsistency in information, and variation in official priorities between different countries. This makes it essential to better understand the different ways in which 'brownfield' has been interpreted as a concept and policy focus in different contexts.

To explore this, four countries - the United States, Canada, England and Scotland - are chosen to provide different combinations of institutional circumstances and brownfield significance. The federal constitutions of the United States and Canada contrast with the more centralised form of governance in the United Kingdom in which, through varying degrees of devolution, the Westminster Parliament permits differences in domestic policy between England, Scotland, Wales and Northern Ireland. Arguably, these differences are at their most intense between England and Scotland, since the different legal systems that have always separated these two nations were reinforced in 1999 by the establishment of the Scottish Parliament as a separate law-making authority. Domestic policy in Scotland has since begun to diverge significantly from that in England. Alongside these institutional differences, the geographical characteristics of these four countries have endowed the term 'brownfield' with varied meanings and significance, which enable

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their diverse experiences to illuminate the search for shared knowledge on the likely constituents of an effective brownfield land policy.

If brownfield locations are to be seen as areas of future urban opportunity rather than as reminders of inherited urban problems, policy may need time to mature, often gradually, but sometimes traumatically. This process becomes effective when it creates an institutional framework in which brownfield land is consistently seen as a source of strategic profit by the private sector and a means of strategic policy delivery by the public sector. To structure and theorise this exposition of brownfield policy development, we offer a three-stage 'policy maturity' model that involves, first, clearly grasping and understanding the brownfield problem; secondly, recognising the potential it contains and securing political commitment to action; and, thirdly, generating engagement from the private sector. The model is essentially concerned with the temporal stages through which what is initially conceived as a policy problem is re-conceptualised over time as a development opportunity. Unless this re-conceptualisation takes place strategically rather than sporadically, brownfield land is unlikely to be seen as a platform for wholesale urban transformation.

We recognise that such stage models of policy formulation are typically criticised for presenting policy formulation in a manner that is too static, too rational, too top-down and too clean-cut (see Downs, 1972; Cohen, et al, 1974; Kingdon, 1984; Anderson, 1997; Hudson and Lowe, 2004). In practice, the policy formulation process is more dynamic, much less rational, more political, and simply messier than simple stage models appear to suggest (**Figure 1**). By comparing brownfield policy development across four countries, we seek to discover how the varied pace and direction of policy change can reflect both the more overt process of political decision-making and the more covert process of policy learning as experience of actions feed back into the search for policy solutions.

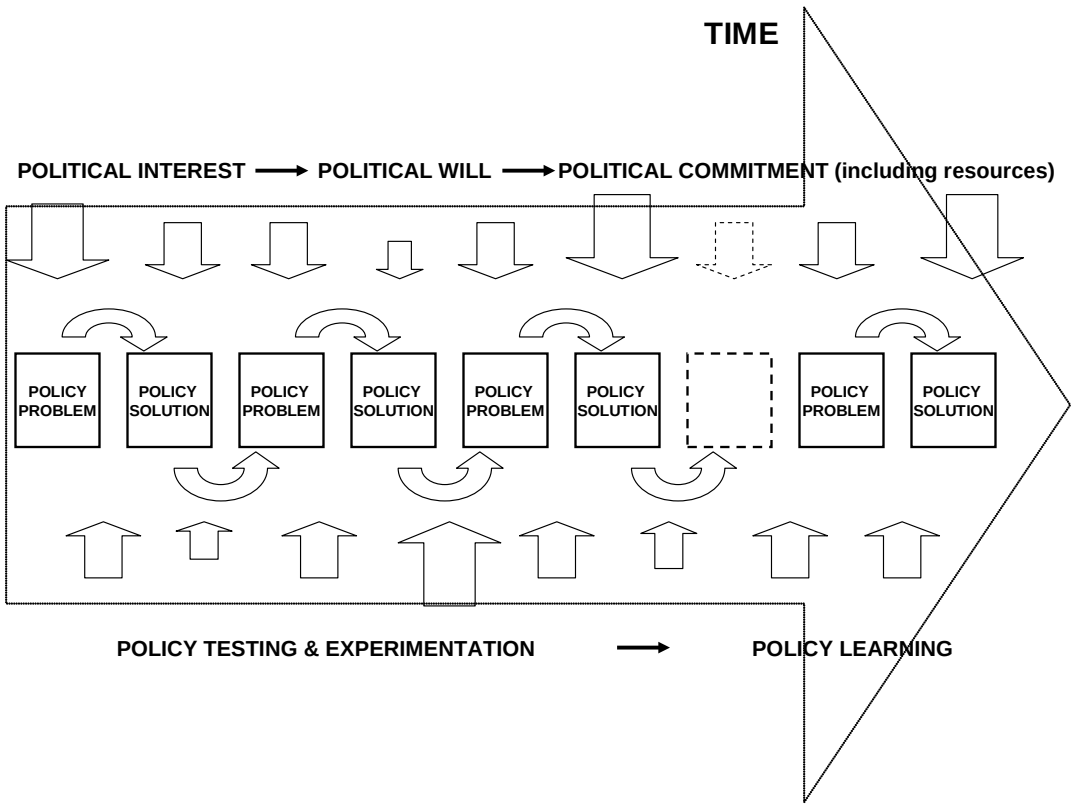

Figure 1: Conceptual model of policy development over time

The central element of the policy formulation process shown in Figure 1 is a dialectic, whereby the definition of a policy problem informs the initial policy 'solution', which informs problem redefinition; re-definition of the problem suggests a new or altered policy solution, and so on over time. In essence, it is a design process where there is an interactive conversation between problem and solution. In this paper, we argue that this dialectic has produced a key conceptual shift, namely a reformulation of the brownfield policy challenge from 'problem' to 'opportunity'.

This dialectic of problem and solution is itself informed and affected by two other major sets of influences. The first is the general maelstrom of politics, with interest by politicians potentially becoming political will and eventually political commitment, noting of course that interest and commitment may falter as governments, ministers and public attention inevitably change. Essential as initial interest and later political and resource commitment are to policy formulation, such influences are essentially top-down. These contrast with a powerful second set of influences, namely the evidence derived from, *inter alia*, experimentation and testing. Over time, evidence thus becomes policy learning as lessons are fed back into the process. Knowledge and experience of practice also helps shape, frame and perhaps extend the 'known' universe of policy solutions. Essentially bottom-up, the impact of these influences on policy varies throughout the policy formulation period. We seek to compare the importance of these influences as we evaluate how brownfield policy has developed in Britain and North America.

Our three-stage 'policy maturity' model is thus intended to reflect a broader conceptualisation of the process that takes account of the forces acting on and within policy formulation. The three stages are reflected in the structure of the paper. The next two sections each look at specific aspects of grasping and understanding the brownfield problem, namely defining the term and mapping its significance. We then move on to consider the second stage of the policy maturity model, which is all about recognising potential and securing commitment. Here again, we look at two aspects of this, namely the growing importance governments attach to brownfield redevelopment and the main constraints that need to be overcome to make such development a reality. This leads to the third stage, where we investigate the keenness (or otherwise) of the private sector to promote brownfield redevelopment. Our thesis here is that the maturing or flowering of brownfield policy becomes evident in the extent and nature of private sector engagement. In the final section, we conclude by evaluating how far each of the four countries investigated have journeyed along the route to policy maturity. We identify both differences and similarities and end by considering whether the main differences in understanding and tackling brownfield land between North America and Britain are due primarily to physical, cultural or institutional factors.

STAGE 1A: GRASPING AND UNDERSTANDING THE BROWNFIELD PROBLEM: DEFINING THE TERM

The **first** stage of policy maturity involves policy makers grasping the full dimensions of 'the brownfield problem'. This requires recognition that the social and economic forces that made former uses redundant deserve as much attention as the physical characteristics of the redundant sites themselves. Since demand for land and property is derived from the use(s) to which it is put, a thorough understanding of the brownfield problem requires policy-makers to connect the site and its locality to the sub-national, national and global. In more tangible terms, grasping the brownfield problem also involves defining and measuring it.

Policy definition makes an essential contribution towards policy solutions. In this context, it is important not to reify particular definitions in a technical or legal sense, but instead to see the gradual process of reaching a clearer set of definitions as dialectic in its own right. Specifically, by

looking at each country's experience we can reveal how the narrowness of one definition presents a policy problem that calls forth the solution of broader re-definition. We argue that this particular dialectic is driven more by policy learning than political imperative.

In the UK, 'brownfield' is a relatively recent addition to the official vocabulary of government. For many years, the emphasis was on derelict land, defined in England as "land so damaged by previous industrial or other development that it is incapable of beneficial use without treatment" (DCLGa, 2006). Derelict land reclamation was promoted as an instrument of regional policy from the 1960s, with local authorities encouraged to seek central government grants for the treatment of land scarred by mineral extraction (particularly from coal mining) or other industrial activity. Regular dereliction surveys revealed how reclamation struggled to keep up with the increasing impact of the deindustrialisation that occurred within cities from the mid-1970s onwards. As a consequence, derelict land grants were deployed more as an instrument of urban than regional policy, with their focus switched in the 1980s from reclamation of urban fringe land primarily for soft-end uses such as parkland to that of inner city land for hard-end uses such as new business parks or housing schemes. Policy-makers thus became less concerned with the presence of contamination and more with the potential for redevelopment.

Regeneration policy took a similar course in Scotland, although here derelict land was defined more precisely as

> "… land which has been so damaged by development or use that it is incapable of development for beneficial use without rehabilitation and which is not being used for the purpose for which it is held or for use acceptable in the local plan or land which is not being used and where contamination is known or suspected (even if treatment is required only for the buildings thereon)" (Scottish Executive, 2005, p. 45).

From the late 1970s onwards, the increasing extent of vacant but not derelict land within cities (DoE, 1992) presented a powerful challenge to UK planning policy, which had long sought to contain the force of counter-urbanisation through green belts and other landscape designations. As the experience of urban deindustrialisation became ever more intense, the earlier policy focus upon derelict land, narrowly defined, was itself perceived as a policy problem that required the solution of re-definition. The term 'brownfield' thus emerged in the UK, not as the encapsulation of any particular condition of the land, but rather as the opposite of 'greenfield' (Alker *et al*, 2000; POST, 1998). The challenge then became one of producing a definition to fit the policy ('to increase brownfield redevelopment'), rather than the other way round. The solution, first officially articulated in the 60% brownfield housing target proposed for England in 1998, was apparently quite simple. If greenfield land has never previously been developed, then by definition, brownfield land must be that which has been previously developed.

As previously developed land (PDL) benefits from greater planning flexibility and, in that potential exists for some overlap at the margin with land that has never been previously developed (for example, a redundant airfield in rural area, 90% of which is grassed), a clear official definition of PDL become necessary. Although this is now given at length in Annex B to Planning Policy Statement 3 (DCLG, 2006b)[4], it is neatly summarised by the ODPM (2005, p. 77) as "… previously developed land that is unused or may be available for development. It includes both vacant and derelict land and land currently in use with known potential for redevelopment. It excludes land that was previously developed where the remains have blended into the landscape over time." This definition is the basis for the English statistics collected for the National Land Use Database (NLUD) reported later in the paper. In Scotland, there is an even more succinct definition of brownfield as

> "Land which has previously been developed. The term may encompass vacant or derelict land; infill sites; land occupied by redundant or unused buildings; and developed land within the settlement boundary where further intensification of use is considered acceptable" (Scottish Executive, 2003, p.19).

Up to 2005, the Scottish Vacant and Derelict Land Survey (the main source of relevant statistics north of the border) had used rather a loose definition of contamination, on the basis of which it reported that in 2005 almost 1,200 hectares or some 16% of all derelict land in Scotland was in some way contaminated. The following year, after the survey had changed its definition of contamination to the more precise requirements of the Environmental Protection Act 1990, it reported that the extent of land known to be affected by contamination was only 132 hectares or less than 2% of all derelict land in Scotland. As this demonstrates, there is little connection between the words 'brownfield' and 'contamination' in the UK, with the policy emphasis placed not on why land became vacant or derelict, but rather on the processes by which it might be put to use in future.

The process of definitional change as part of policy development is also apparent in the US and Canada, although in different ways from the UK. The original focus in both countries in the early 1980s was on contamination. The distinction was often made between *known* contaminated sites - those that had been identified through appropriate testing - and *potentially* contaminated sites - those suspected of being contaminated because of their previous land-use or from an on-site environmentally-detrimental event. The term brownfields was adopted in order to attenuate the negative connotations and liability implications associated with the label *contaminated*, especially in the US where federal actions under the Comprehensive Environmental Response, Compensation, and Liabilities Act (CERCLA 42 U.S.C. 9601-9675, 1980, commonly referred to as Superfund) began discouraging private investment in any property remotely suspected of contamination.

[4] Annex B states: "Previously-developed land is that which is or was occupied by a permanent structure, including the curtilage of the developed land and any associated fixed surface infrastructure. The definition includes defence buildings, but excludes:

- Land that is or has been occupied by agricultural or forestry buildings.
- Land that has been developed for minerals extraction or waste disposal by landfill purposes where provision for restoration has been made through development control procedures.
- Land in built-up areas such as parks, recreation grounds and allotments, which, although it may feature paths, pavilions and other buildings, has not been previously developed.
- Land that was previously-developed but where the remains of the permanent structure or fixed surface structure have blended into the landscape in the process of time (to the extent that it can reasonably be considered as part of the natural surroundings)"

The most common definition of brownfield in both the US and Canada is the one put forward by the US EPA when it formally launched its Brownfields Action Agenda in 1995.[5] The agency defined brownfields as "… abandoned, idled, or under-used industrial and commercial facilities where expansion or redevelopment is complicated by real or perceived environmental contamination." Subsequently, the US *Small Business and Liability Relief and Brownfield Revitalization Act* (Public Law 107-118, H.R. 2869, p. 6), signed into law in 2002, has changed the definition slightly to: "Real property, the expansion, redevelopment, or reuse of which may be complicated by the presence or potential presence of a hazardous substance, pollutant, or contaminant." As a concept, brownfields continues to refer to both *known* and *potentially* contaminated sites, although direct reference to commercial and industrial sites is no longer implicit in the term. As in the UK, this broadened definition represents an official response to perceived policy experience at the local level.

While the term *contaminated land* continues to be used in legislative contexts in Canada, most stakeholders favour the term brownfield because it avoids the negative connotations associated with the word *contaminated* and because it constitutes a semantic counterpart to *greenfield*. Canada has also modified its definition of the term brownfield over the years to accord more with the US definition:

> "Abandoned, idle or underutilized commercial or industrial properties where past actions have caused known or suspected environmental contamination, but where there is an active potential for redevelopment." (NRTEE, 2003, p. ix)

The more narrow Canadian reference to development potential (reflecting market viability) and to commercial and industrial property is likely to change over time to conform to the US definition. In both Canada and the US, 'brownfields' has now become a term widely used in public policy, the development industry and even common parlance.

Unlike the UK and Scotland, vacant and unused land that is not suspected of contamination is not labeled as a brownfield. This has led to the separate use of the term vacant land and to the creation of terms such as 'greyfield', which refers to outdated retail and commercial sites where contamination is not necessarily suspected (Pagano and Bowman 2000)[6]. Here, we see a pragmatic and 'bottom-up' solution seeking to overcome the narrowness of official decisions. Yet, even if laudable from an urban renewal perspective, broadening the term 'brownfield' could face political and administrative barriers in the USA and Canada. In the US, the dominance of the US Environmental Protection Agency and state environmental agencies in brownfield matters have created an environmental policy imperative, whether in relation to contamination or the larger question of sustainability. Many Canadian provinces have also kept the focus on contamination to minimize the risk of local government interference into the property market, both within and between cities.

From this analysis, we can see how the term 'brownfield' has evolved in meaning across all four countries as unofficial 'bottom-up' conceptualisations and experience in practice have interacted with official definitions. Significantly, the process of policy re-conceptualisation, which emphasises the development potential of brownfield land irrespective of use, has required broader official

[5] Interestingly, the term 'brownfield' had been first employed in the US by Charles Bartsch from the Northeast Midwest Institute, a non-profit agency, who used the phrase 'brownfield expansion' to describe a specific type of process for modernizing existing steel plants rather than necessarily to connote a potentially contaminated site (Yount, 2003).

[6] Other recent additions to US brownfield language include UST-fields (leaking underground storage tanks) and Portfields (location where many brownfield sites cluster).

definitions across all countries that reflect the experience of earlier policy testing. In the final section of the paper, we seek to account for the different definitions that still exist in Britain and North America. At this point, however, it is important to note that no single definition should be regarded as fixed, but rather as reflective of the particular understanding of the policy problem at that time and, until its shortcomings become apparent, the perceived basis for policy solutions.

STAGE 1B: GRASPING AND UNDERSTANDING THE BROWNFIELD PROBLEM: MAPPING ITS SIGNIFICANCE

Grasping the brownfield problem also involves measuring as well as defining it. This makes the creation of effective brownfield information systems another important component of the policy response to the perceived problem. In this section, we draw on recent research and publicly available statistics to examine the significance of brownfield land in each country. One might expect more sophisticated information systems to be a useful indicator of policy maturity. Yet, a contrast must also be drawn between the British emphasis on national information systems, which places national consistency above local innovation and those in North America, which allow much local experimentation, albeit at the expense of national consistency.

As already intimated, the two main UK data sources tracking the extent of brownfield land are the National Land Use Database (NLUD) and the Scottish Vacant and Derelict Land Survey (SVDLS). While both surveys are published on an annual basis, allowing trend information to be portrayed, NLUD is more recent and provides a clearer view of development potential.

NLUD was launched in 1998, updated in 2001 when minor changes were made to the definitional base, and has thereafter been published on an annual basis. Significantly, the database is not limited to land and buildings already vacant but seeks to make some assessment of important redevelopment opportunities likely to arise in the future, even if still in current use. It therefore categorises entries under five headings:

- Previously developed land which is now vacant
- Vacant buildings
- Derelict land and buildings
- Land or buildings currently in use and allocated in the local plan and/or having planning permission
- Land or buildings currently in use where it is known there is potential for redevelopment (but the sites do not have any plan allocation or planning permission)

In each case, NLUD makes some estimate of residential development potential by indicating the extent of land considered suitable for residential development and the dwellings capacity, given certain (changing) density assumptions. Since NLUD information is gathered from individual local authorities, the results are available by the nine English regions and for each local authority. However, our concern here is primarily with trends in the national figures since 2001, when the current definitional base was established. These are shown in **Table 1**.

Table 1: Trends in previously-developed land by land type: England 2001 to 2007 (Hectares)							
Land/building type	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**
Vacant and derelict land and buildings							
Previously-developed vacant land	14,730	15,680	14,610	14,100	13,920	13,330	12,710
Derelict land and buildings	21,410	19,960	20,550	19,870	18,720	17,850	16,810
Vacant buildings	4,990	5,070	4,550	4,200	3,920	3,670	4,080
All vacant and derelict land and buildings	**41,130**	**40,710**	**39,710**	**38,170**	**36,560**	**34,850**	**33,600**
Index (2001 = 100)	100.0	99.0	96.5	92.8	88.9	84.7	81.7
Currently in Use							
Allocated in a local plan or with planning permission for any use	14,030	16,570	17,580	18,120	18,920	18,430	17,770
Known redevelopment potential but no planning allocation or permission	10,350	8,830	8,470	7,840	8,010	9,450	10,750
All currently in use	**24,380**	**25,400**	**26,050**	**25,960**	**26,930**	**27,880**	**28,520**
Index (2001 = 100)	100.0	104.2	106.8	106.5	110.5	114.4	117.0
Total	**65,510**	**66,110**	**65,760**	**64,130**	**63,490**	**62,730**	**62,120**
Index (2001 = 100)	100.0	100.9	100.4	97.9	96.9	95.8	94.8
Residential development potential							
Land considered suitable for housing	28,060	28,000	29,000	28,600	27,600	26,750	26,510
Index (2001 = 100)	100.0	99.8	103.3	101.9	98.4	95.3	94.5
Dwellings capacity	919,100	870,000	950,000	986,000	981,000	974,000	1,051,030
Index (2001 = 100)	100.0	94.7	103.4	107.3	106.7	106.0	114.4
Density assumption	32.8	31.1	32.8	34.5	35.5	36.4	39.6
Source: Department of Communities and Local Government - National Land Use Database (2006) (2007) and (2008)							

As Table 1 shows, in 2007 some 62,120 hectares of land in England was either vacant, derelict or considered to have redevelopment potential. To set this figure in context, it represented some 5.4% of the total developed area of urban England. Between 2001 and 2007, there was an 18% reduction in the extent of vacant land and buildings in England, but a 17% increase in land currently in use but considered to have redevelopment potential. While the extent of land within NLUD considered suitable for housing (about 43% of the total by 2007) fell slightly between 2001 and 2007, the dwellings capacity rose by about 14% over this period, primarily because density assumptions were increased as a result of changing government policy. The three regions with the highest amount of vacant and derelict land and buildings in 2007 were respectively North West England, Yorkshire and the Humber and the West Midlands, each of which has borne the brunt of successive waves of deindustrialisation from the mid-1970s. In contrast, the prosperous South East of England had by far the largest amount of land currently in use but considered to have redevelopment potential, so highlighting the strength of market demand as the main redevelopment driver.

The overall pattern of change shown in Table 1 subsumes both inflows and outflows. For example, although the total amount of NLUD land fell by only 1% between 2004 and 2005 (from 64,130 to 63,490 hectares), this disguised the fact that some 6% of the 2004 total was developed by 2005, and another 4% was withdrawn from the survey as it no longer fitted the definitional requirements. This outflow was matched by an inflow equivalent to 7% of the 2004 total. There is an important lesson here for those who mistakenly concentrate on the brownfield stock and see it as a finite resource, gradually to be whittled down to zero. In fact, annual flows into and out of the stock are likely to be far more significant in the long term, since they reflect the reality of a complex redevelopment process in which redundancy will always be producing new brownfield sites, while redevelopment will be making use of others. The relative balance between these two forces at any point in time will be the main determinant of changes in the stock.

A clearer picture of how these components of change affect the overall stock each year can be gleaned from the Scottish Vacant and Derelict Land Survey, which has been undertaken north of the border over a longer time period than NLUD. The results (presented in **Table 2**) again show how the almost static stock of vacant and derelict land between 2001 and 2007 disguises significant annual inflows and outflows. These may be due to real change (redundancy or redevelopment) naturalisation or to definitional or unexplained change. Even though the latter are a relatively small proportion of the total stock, they can have an important influence on the annual flow, suggesting room for improvement in the way the data is collected.

In the US, national tracking of brownfield sites and their redevelopment is sporadic and does not involve accurate accounting. Over time, a tiered system has crystallized whereby the different levels of government work in tandem to compile and manage different kinds of brownfield information. Hazardous waste sites deemed to pose the greatest risk to human health and the environment are tracked on the EPA's computerized inventory system (CERCLIS), thus coming under the jurisdiction of the *Superfund* programme. Hazardous waste information related to treatment, storage, and disposal facilities is also catalogued nationally in the Resource Conservation and Recovery Act Information (RCRAInfo) system.

Table 2: Vacant and Derelict Land in Scotland: Components of Change Analysis 1996-2007 (Hectares)												
	1996	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**
Year Start												
Stock of derelict land brought forward	8778	8482	7858	7787	7237	7148	6825	7614	7624	7658	7615	7480
Stock of vacant land brought forward	4944	4619	4612	4425	4371	4086	3692	2982	2890	2819	2874	2906
Total vacant and derelict land brought forward	**13722**	**13101**	**12470**	**12212**	**11608**	**11234**	**10517**	**10596**	**10514**	**10477**	**10489**	**10386**
Inflows												
Land becoming derelict	192	228	542	460	363	234	932	293	190	331	155	232
Land becoming vacant	234	382	369	479	184	287	210	196	220	385	300	136
Total inflows	**426**	**610**	**911**	**939**	**547**	**521**	**1142**	**489**	**410**	**716**	**455**	**368**
Ouflows												
Derelict land reclaimed	293	616	468	764	301	449	293	308	181	448	252	324
Vacant land brought into use	395	374	355	537	299	343	391	271	285	287	305	318
Derelict land removed from register for definitional reasons	329	98	288	146	171	106	116	72	136	11	42	36
Vacant land removed from register for definitional reasons	50	79	106	59	35	249	237	88	37	13	73	72
Derelict land removed from register owing to naturalisation					64	185	187	101	1			17
Vacant land removed from register owing to naturalisation					12	67	30	13		72	90	20
Total outflows	**1067**	**1167**	**1217**	**1506**	**882**	**1399**	**1254**	**853**	**640**	**831**	**762**	**787**
Other Adjustments												
Unexplained change in derelict land	134	-138	143	-100	84	183	453	198	162	85	4	245
Unexplained change in vacant land	-114	64	-95	63	-123	-22	-262	84	31	42	200	28
Total other adjustments	**20**	**-74**	**48**	**-37**	**-39**	**161**	**191**	**282**	**193**	**127**	**204**	**273**
Total Net Flow	**-621**	**-631**	**-258**	**-604**	**-374**	**-717**	**79**	**-82**	**-37**	**12**	**-103**	**-146**
Year End												
Stock of derelict land carried forward	8482	7858	7787	7237	7148	6825	7614	7624	7658	7615	7480	7580
Stock of vacant land carried forward	4619	4612	4425	4371	4086	3692	2982	2890	2819	2874	2906	2660
Total vacant and derelict land carried forward	**13101**	**12470**	**12212**	**11608**	**11234**	**10517**	**10596**	**10514**	**10477**	**10489**	**10386**	**10240**
Derelict land as % of total stock	64.7	63.0	63.8	62.3	63.6	64.9	71.9	72.5	73.1	72.6	72.0	74.0
Vacant land as % of total stock	35.3	37.0	36.2	37.7	36.4	35.1	28.1	27.5	26.9	27.4	28.0	26.0
Net flow due to real change	-262	-380	88	-362	-53	-271	458	-90	-56	-19	-102	-274
Net flow due to definitional, natural or unexplained change	-359	-251	-346	-242	-321	-446	-379	8	19	31	-1	128
Source: Scottish Vacant and Derelict Land Surveys 1996-2007												
There is no strict definition of the term 'naturalisation' in the survey, although it is used in reference to vacant or derelict sites that "appear to have blended back into the												

Many state and local governments also maintain brownfield inventories, although there is no standardized approach for identifying the types of sites to be included or the information maintained. Over a dozen states also maintain extensive records on brownfield projects involved in their voluntary cleanup programs, although the data recorded in such cases is highly variable (US EPA 2006). Unfortunately, the type of information gathered by most states and cities does not allow for an assessment of the overall increase or decrease in the stock of brownfield land, making it difficult to track progress. By far the most widely referenced local government source of information regarding the quantity of urban brownfield sites in the US are the US Conference of Mayors surveys, which have been administered to member local governments since 1998. It should be noted, however, that participation in this survey is voluntary and that there are no specific parameters set for defining and tracking brownfield data. Syms and Simons (1999) note that the lack of a comprehensive registry system in the US has been partly attributed to resistance from real estate interests, fearing the stigma that could be attached to property if it were listed.

In the early 1990s, the Canadian federal government attempted to develop a national approach to brownfield inventory-making, but provinces were unable to reach an agreement on the scope and potential use of a contaminated sites inventory (Auditor General of Canada, 1995). Consequently, the federal government set up a *Contaminated Sites Management Working Group* in 1995 to gather appropriate information only for federal lands. Federal departments have also developed a consistent classification of contaminated sites based on the extent to which they require remedial action.

Except for federal contaminated sites, only sporadic data can be found with regard to the brownfield situation in Canada. No standard municipal approach for brownfield inventories exists and only a handful of cities have developed one of their own. As in the US, most cities and government agencies continue to postpone the development of formal brownfield inventories for fear that properties might be stigmatized and their values reduced, with liabilities ensuing for the agencies involved in compiling them.

It is thus not possible to provide comprehensive brownfield statistics for the United States and Canada, although in Table 3, we have sought to gather together findings from some of the studies undertaken in recent years. Despite the advantage of local variation and innovation in the brownfield statistics that are kept in North America, lack of political interest and will keeps this aspect of brownfield policy at an immature stage since it remains impossible to know whether the problem is getting larger or smaller. This contrasts with the British experience, where the requirement for comprehensive statistics has been driven from the political centre and has ensured that policy-makers can now access better information than their predecessors of two decades ago. Nevertheless, in Britain and especially in North America, there remains scope for more systematic and detailed data, as experience reveals the limitations of existing systems, calling forth further refinements to overcome their problems. A key point, however, for our policy maturity model, is that limited information does not necessarily inhibit policy advancement, as the discussion of Stage 2 of the model next makes clear.

Table 3: Summary of findings from key studies on extent of brownfields in United States and Canada		
Source	**Focus**	**Findings**
United States		
Simons (1998)	US as a whole	Over 384,400 brownfield sites
Simons (1998)	31 of largest US cities	Over 75,000 brownfield sites, taking up over 46,000 hectares or 6% of land area
US Government Accountability Office (2000)	US as a whole	Between 130,000 and 450,000 commercial and industrial brownfield sites
Pagano and Bowman (2000)	70 US cities	On average 15% of city land deemed vacant, ranged from undisturbed open space to brownfield land
US Conference of Mayors (2006)	172 US cities	23,810 brownfield sites of between 2 and 6 hectares in size. Total brownfield land in subset of 158 cities amounted to almost 39,00 hectares
US Environmental Protection Agency (2006)	US as a whole	48,000 brownfield sites already cleaned up via state Brownfields and Voluntary Response Programs
US Environmental Protection Agency (2007)	US as a whole	Between 450,000 and 1,000,000 brownfield sites
EPA (2007) National Priorities List	US as a whole	1,618 brownfield sites designated in most hazardous category, of which 1,240 active, 317 archived and 61 proposed
Canada		
Sisson (1989)	Canada as a whole	Around 30,000 potentially contaminated brownfield sites
National Round Table on the Environment and the Economy (1996)	Canada as a whole	Around 2,900 potentially contaminated brownfield sites
Contaminated Sites Management Working Group (1997)	Environmental site assessment of over 4,400 Canadian federal sites	Action definitely required at 860 sites, probably required at 1,784, and likely to be required at 1,088
De Sousa (2006a)	11 largest Canadian cities	Over 1,900 brownfields amounting to around 11,300 hectares
De Sousa (2006a)	12 Canadian cities	Some 203 remediation/redevelopment projects completed in 12 cities; divided between residential (47%) retail (20%), commercial/office (16%), open space (12%), industrial (2%), and institutional (2%) according to data from 7 of those cities.

STAGE 2A: RECOGNISING POTENTIAL AND SECURING COMMITMENT: THE IMPORTANCE GOVERNMENTS ATTACH TO BROWNFIELD REDEVELOPMENT

The **second** stage towards policy maturity involves policy-makers moving beyond the definition and measurement of brownfield land towards recognition and articulation of its potential. Going well beyond treatment policies targeted at individual sites, this involves an appreciation of the potential overall contribution of brownfield land towards the achievement of broader policies. While it includes the articulation of new urban visions and development products, this stage is much more than a simple promotional exercise. This is because realisation of potential requires a mature understanding of the actions needed to achieve it. Since brownfield land is by definition often intricately embedded into the urban fabric, recognition of potential is thus clearly associated with an appreciation that its realisation requires practical action to overcome physical, ownership and other constraints to its redevelopment.

There has been a clear correlation, at least in England, between government interest in brownfield redevelopment and the extent of public and political concern about environmental matters and, specifically about the likely scale of prospective greenfield development. It provides the best example among the four countries of how the progression from political interest to political will and then political commitment can drive the search for policy solutions to perceived problems. Three specific turning points in brownfield policy illustrate this well. In March 1995, the then Conservative Government published new and highly controversial household projections, which suggested that households numbers in England would increase by 4.4 million (or 23%) between 1991 and 2016 (DoE, 1995). Subsequently, that June, it announced that it wished to see half of all new homes in England built on re-used sites. Although primarily aspirational, this announcement represented the first serious political interest in brownfield policy in the UK. As Murdoch (2004, p. 53) comments:

> "The publication of this (4.4 million) figure conjured up the spectre of new houses spreading across the English countryside. It therefore allowed the Campaign for the Protection of Rural England (CPRE) and other environmental groups to mount a serious challenge to the 'demand-led' discourse, which they claimed had long prevailed within the planning-for-housing arena. This challenge profoundly affected the political context around planning and led John Major's Conservative government to defer making any decision on the allocation of land for the required new homes prior to the 1997 General Election. Thus, Tony Blair's Labour Government inherited a planning for housing crisis and needed to quickly put a viable planning-for-housing policy into operation. In formulating its proposals, the new government seemed surprisingly receptive to CPRE's views."

This crisis heralded the second turning point in brownfield policy which came in 1998 when John Prescott, the incoming minister responsible for planning and housing announced that the new Government intended "… to raise the proportion of new homes we expect to be built on previously developed land from 50% to 60%, to be achieved over the next ten years" (DETR, 1998, paragraph 4).

Prescott's expression of political will was shortly followed by political commitment. In the final version of this policy, it was decided to include conversions within the 60% target, which was then formally expressed as follows: "The national target is that by 2008, 60% of additional housing should be provided on previously-developed land and through the conversion of existing buildings" (DETR, 2000a, paragraph 23).

Table 4: Total dwellings built on previously-developed land plus estimated conversions in England 1985-2007

Year	Land					Dwellings			
	Total hectares of land used for new housing	Percentage of new dwellings built on previously developed land	% of land used for new housing that was previously developed	Total hectares of land used for new housing that was previously developed	Index of land used for new housing that was previously developed	Total new dwellings completed	% of dwellings built on previously developed land plus estimated conversions	Total dwellings built on previously developed land plus estimated conversions	Index of dwellings built on previously developed land plus estimated conversions
1985	8760		39	3416	107.8				
1986	7055		38	2681	84.6				
1987	7500		38	2850	89.9				
1988	7730	52	41	3169	100.0				
1989	5660	52	44	2470	77.9		55		
1990	7240	51	45	3270	103.2	163899	54	88505	107.0
1991	4640	50	45	2080	65.6	154595	53	81935	99.0
1992	5200	53	47	2470	77.9	143831	56	80545	97.4
1993	5570	53	48	2700	85.2	147835	56	82788	100.1
1994	6230	51	46	2880	90.9	154641	54	83506	100.9
1995	5820	54	48	2820	89.0	157141	57	89570	108.3
1996	5120	54	48	2430	76.7	149086	57	84979	102.7
1997	5630	53	47	2660	83.9	149493	56	83716	101.2
1998	5490	55	48	2650	83.6	142651	58	82738	100.0
1999		56	50			141040	59	83214	100.6
2000	5370	59	52	2790	88.0	135130	62	83781	101.3
2001	5460	61	55	2990	94.3	129530	64	82899	100.2
2002	5050	64	57	2870	90.6	136820	67	91669	110.8
2003	5250	67	58	3030	95.6	144040	70	100828	121.9
2004	3780	72	62	2340	73.8	154110	75	115583	139.7
2005	4240	74	63	2670	84.2	159480	77	122800	148.4
2006	4090	73	64	2620	82.7	160870	76	122261	147.8
2007		73	69			174550	77	134404	162.4
2008						141930			

Source: Department for Communities and Local Government: Land Use Change Statistics for 2007 and Housebuilding Statistics Live Table 217 (2009)

What happened next provides an excellent illustration of the dialectic introduced in Figure 1. Those who regarded the imposition of the 60% target as 'problem solved' were soon to be disappointed, for in practice, it had merely changed the nature of the problem and initiated the search for a new solution. While headline figures suggested a steady improvement in the target figure from 58% in 1998 to 64% in 2001, this disguised an almost static picture in the number of dwellings completed on brownfield land in England, which remained around 83,000 in both years. This was a classic case where the virtual reliance of the policy on the planning system to refuse greenfield development helped cut overall housebuilding from almost 143,000 in 1998 to below 130,000 in 2001, while doing almost nothing to produce additional brownfield development. This is revealed in **Table 4**, which for the first time, brings together in some detail separate official statistics on housebuilding and land use to demonstrate the limitations of proportionate brownfield targets. The resultant concerns over increasing house prices and restricted affordability caused the Government to establish the Barker Review (2003 & 2004) and produced the third turning point in brownfield policy, with the publication of the Sustainable Communities Plan (ODPM, 2003).

To address the growing housing shortage, especially in South East England, the Sustainable Communities Plan proposed additional development of some 200,000 houses by 2016 above previously planned figures to be built in four growth areas, three of which were primarily greenfield locations. It can be regarded as an intended solution to some of the problems created by the 60% brownfield target. Such a plan would have been politically unfeasible in the context of intense pressure from anti-development and environmental interests, unless matched by a more explicitly interventionist approach to brownfield development to replace the previous mere reliance on a target figure. The heart of this new interventionist approach involved "a new strategic role" for English Partnerships (the Government's urban regeneration agency) "… to find and assemble land, especially brownfield and publicly owned land, for sustainable development" (ODPM 2003, p. 40). Crucially, English Partnerships was charged with developing a comprehensive national strategy for brownfield land and allocated over £500 million over three years to find and assemble housing sites. Although this was not devoted entirely to brownfield development, it enabled the agency to play a central enabling role in the development of the Thames Gateway, the fourth and largely brownfield growth area identified in the Sustainable Communities Plan.

Other actions taken by English Partnerships included recourse to compulsory purchase powers to assemble brownfield land and an explicit programme targeted at the 17,000 hectares of hardcore brownfield land registered on NLUD, which has remained vacant or derelict since 1993. By 2005, the results of this more interventionist approach to brownfield land were beginning to show, with almost 123,000 dwellings completed on brownfield sites in that year. It had taken over a decade for the Government to realise that the real test of its 'brownfield first' approach was not its apparent commitment in principle but its willingness to devote powers and resources to effective intervention in the land market.

Instead of a national brownfield target, local planning authorities in Scotland are encouraged to "… promote the re-use of previously developed land in preference to greenfield land, provided that a satisfactory residential environment can be created" (Scottish Executive, 2003, paragraph 29). No public agency has prime responsibility for the reduction of vacant and derelict land and expenditure has been modest.

Until the mid to late 1990s regeneration activity in Scotland had a strong physical dimension, including an emphasis on bringing brownfield land forward for redevelopment. Subsequently, it concentrated instead on economic development and social inclusion, especially after the election of the newly-devolved Scottish Parliament in 1999. There is an uneven geographical distribution

of brownfield land in Scotland. As the National Planning Framework (Scottish Executive, 2004, paragraph 156) makes clear:

> "While the greatest opportunities for reusing previously developed land lie in Glasgow and the Clyde Valley, the demand for land for new development is focused more strongly on the East. Even with a more even pattern of economic activity, there will be a need to accommodate a substantial growth in the number of households in or close to the Edinburgh city region over the next 25 years."

The Scottish experience demonstrates political interest in brownfield redevelopment, but not political will or commitment. This tentative approach can best be explained by limited strength of the environmental/rural protection lobby in Scotland, compared to England. As Table 2 showed, there has thus been hardly any reduction in vacant and derelict land in Scotland since 2001. This unwelcome pattern is unlikely to change without a radical re-think of brownfield land policy in Scotland.

In contrast, there is considerable evidence of political interest, will and commitment to brownfield redevelopment in the United States. This, however, is not solely driven by federal mandates, but by state and local experimentation and initiative. In 1994, for example, the US Conference of Mayors cited brownfield land cleanup and redevelopment as its top priority. Since then, policy efforts aimed at redeveloping brownfield land, reducing risks to the environment and public health, and restoring blighted communities continue to receive support from numerous public, private, and nonprofit stakeholders. The Congressional vote to pass the Small Business Liability Relief and Brownfields Revitalization Act, for instance, was overwhelming and bi-partisan (Wernsted *et al*, 2004). Funding for the brownfield land programs has also remained stable over the last half-decade despite a decline in other environmental areas.

Much of the financial and regulatory support for brownfield land redevelopment in the US since the mid-1990s has been led by the federal Environmental Protection Agency. Unlike the British focus on protecting greenfield land, US attention has focused on economic development projects that seek to create or preserve businesses, jobs, and taxation structures in the inner city, particularly in Northeast and Midwest areas affected by deindustrialization (Bartsch 1996). The EPA introduced the *Brownfields Action Agenda* in 1995 to help clarify the Federal Government's role in brownfield land, make funds available for pilot projects to test redevelopment approaches, and provide direct assistance to those interested in redeveloping sites. This example of federal commitment to learning from experience was further strengthened in 1997 when the federal government announced the Brownfields National Partnership Action Agenda bringing together the resources of more than 15 federal agencies. The EPA estimates that since its inception in 1995, investment in the Brownfields Program has leveraged more than US$6.5 billion in brownfield land cleanup and redevelopment funding from the private and public sectors and created approximately 25,000 new jobs (US EPA, 2007a).

In the early to mid-1990s, many state governments began implementing *Voluntary Clean-up Programs* to loosen rigid redevelopment policy structures and offer more support for redevelopment and protection from liability. While the US EPA continues to manage the cleanup of the country's most contaminated sites, most brownfield land is now managed via state programmes. All 50 states have participated in the federal government's brownfield programme and have established *Voluntary Cleanup Programs* (VCPs), up from 30 in 1997 (Jenner *et al*, 1997; Simons, 1998; Meyer and Lyons, 2000). As might be expected from more 'bottom-up' policy solutions, State programmes vary in the way in which cleanups are implemented and extent of state oversight (National Brownfields Association 2005).

As with the federal EPA, state governments favour directing resources to properties with some economic development activity or taxable end use, as opposed to just cleanup (US EPA, 2006). Local government goals have also been primarily inclined toward economic development with tax base growth, job creation, neighbourhood revitalization, and environmental protection being the most frequently cited benefits according to municipalities surveyed by the US Conference of Mayors. Those involved in housing development have pointed out that despite the increase in market demand for housing in many cities, it continues to be difficult to obtain funds for residential projects because grant criteria emphasise jobs and tax benefits. Thus, again, one apparent solution to brownfield decay creates another problem in setting the boundaries for benefit.

Despite stakeholders in Canada also decrying the complexity, uncertainty, and variability of regulatory systems overseeing remediation and redevelopment, the federal government has given this relatively little attention. Indeed, federal interest in brownfield land redevelopment has consisted largely of information gathering, federal property management, and limited financial assistance provision. In December 2001, the federal government assigned the task of developing a national brownfields redevelopment strategy for Canada to the National Round Table on the Environment and the Economy (NRTEE). The NRTEE convened a task force of stakeholders representing different interests who worked to develop recommendations for all levels of government. Its 2003 strategy articulated a vision for transforming Canada's brownfield land into economically productive, environmentally healthy and socially vibrant centers of community life through the coordinated efforts of all levels of government, the private sector and community organizations. It was not until 2005, however, that the Federal Government announced several long-term commitments to funding redevelopment (Industry Canada, 2005; aboutremediation.com, 2006). Of the almost $5bn committed, over 95% was earmarked for federally-related projects and technological development.

Most brownfield regulation in Canada is the responsibility of provincial or municipal government, which typically holds the private sector financially responsible for cleanup and development. Cities with strong real estate markets, such as Vancouver and Toronto, along with the growing suburban municipalities, have been highly successful in realizing brownfield projects, despite little or no financial assistance from government. Industrial brownfield land has often been rezoned to residential use, thus raising land values and allowing developers to manage contamination while making a suitable profit. In Quebec, stronger financial and management support from both local and provincial governments has made development possible in weaker market areas.

Unfortunately, smaller peripheral communities in Canada with industrial legacies, weaker real estate markets, and limited resources face tough challenges because their plight is often overshadowed by the relative success of strong-market municipalities within the same province. This has induced a more hands-off and piecemeal approach by upper levels of government in implementing policy and funding measures, ultimately slowing down the maturing and convergence of such policies within Canada. Nevertheless, rapid growth in some urban regions has rekindled provincial concern about sprawl and sustainability. Canada's largest province, Ontario, recently introduced greenbelt legislation that aimed to provide a stimulus to brownfield development, while British Columbia announced in 2008 a $10-million remediation fund to create green opportunities on brownfield land.

In both Britain and North America, brownfield policy development can be characterised as a reaction to both the emerging brownfield agenda itself and to the pressures brought to bear by environmental or local governance interests seeking a solution. Moreover, as the English experience shows in particular, when hesitant and partial responses by government were shown to

be adequate, these experiential feedback mechanisms created the demand for further policy refinement. The much stronger central government involvement in England, even in comparison with Scotland let alone North America, has channelled significant public resources to tackling market failure, rather than simply exploiting market success. The latter approach, which has been more evident in Canada and to a lesser extent, Scotland and the United States, reflects a more limited and decentralised form of government intervention that emphasises local solutions to locally perceived problems.

STAGE 2B: RECOGNISING POTENTIAL AND SECURING COMMITMENT: IDENTIFYING AND TACKLING THE MAIN CONSTRAINTS TO BROWNFIELD REDEVELOPMENT

The **second** stage of policy maturity thus also involves an express political commitment to action aimed at tackling the main constraints to redevelopment. Strategic re-conceptualisation of brownfield land as a development opportunity rather than a planning problem occurs only if there is sufficient confidence for such development to be seen as a real business opportunity. The importance of this stage lies not in any broad policy statement issued by government but rather in the specific bestowal of financial resources or legal powers that demonstrate real commitment to private-sector developers and financiers. Tackling development constraints provides a good example of policy iteration for, like peeling the onion, the process of solving what initially appears to be the most important type of constraint merely helps reveal yet another type of constraint that requires yet more solutions. Experience across Britain and North America suggests that much of the onion has still to be peeled, as far as policy understanding of development constraints is concerned.

Redevelopment of brownfield land can be constrained on both the demand and supply sides. On the demand side, both NLUD and SVDLS reveal that brownfield potential in the UK is regionally imbalanced, with a disproportionate concentration found in regions with traditionally weaker property markets. For example, in 2005, the former heavily industrialised North West of England had the largest amount of any English region both of previously-developed land (11,900 hectares) and of that which was vacant or derelict (8,700 hectares). In contrast "there is a lack of readily available urban brownfield land in the Southern regions compared with the Midlands and Northern regions" (English Partnerships, 2006, p. 25). There is a similar uneven geographical distribution of brownfield land in Scotland, with brownfield supply concentrated in Glasgow and the Clyde Valley, while demand for new development has been more focused around Edinburgh.

Despite an extensive academic and policy literature of supply-side constraints to development, there is hardly any serious analysis in either NLUD or SVDLS of the extent to which brownfield land is so constrained. The nearest either sources approaches this crucial questions is in the analysis of development potential with SVDLS. This reveals that for sites where information was known in 2006, 41% of SVDLS land within settlements and 15% of that in the countryside was considered developable in the short term. If this is taken as a proxy for wholly unconstrained sites, it would suggest that almost 60% of urban land and 85% of rural land is in some way constrained. However the limited scope of this aspect of SVDLS cautions against over-interpretation of these figures and highlights instead the important research challenge of promoting consistent methods to classify and measure supply-side constraints to development. Traditionally, these have been conceptualised as falling under three main heading: planning/regulatory, physical and ownership.

Although central government enthusiastically promotes the redevelopment of brownfield land, planning or regulatory constraints may counteract this policy at a local level. Two reasons for this are worth particular mention. First, local planning authorities may wish to reserve sites for an

apparently useful purpose for which current demand is low (for example, manufacturing industry) by preventing their immediate development for another purpose for which current demand is high (for example, housing). Secondly, potential local opposition to brownfield redevelopment should not be underestimated, especially in those parts of urban areas that "… are perceived as over-developed, or overcrowded by their residents, where valuable open space has been lost, traffic is congested, and air, noise and light pollution are having a detrimental effect on the quality of life" (Williams *et al*, 1996, p. 93). Such resident opposition can readily influence the democratic process by which local planning decisions are made.

Physical constraints may include the presence of substantial underground obstructions, such as old foundations or machinery bases, and redundant services. However, as Gore & Nicholson (1985, p. 187) pointed out: "Physical constraints … do not necessarily prevent development, as they can normally be expressed in terms of extra preparation or construction costs." According to the Urban Task Force, even contamination (with the obvious exception of nuclear waste) should not be seen as a primarily technical problem since "In almost all cases, it is essentially a problem of finance and/or perceived legal risk" (Urban Task Force, 1999, p. 238).

Ownership constraints in the UK have been more systematically analysed than planning or physical constraints. Adams *et al* (2001) contend that an ownership constraint can be said to exist if development is unable to proceed because the required ownership rights cannot rapidly be acquired through normal market processes. On this basis, they suggest that five main types of ownership constraints can be identified:

- Ownership itself may be unknown or unclear;
- Ownership rights may be divided if the power of freehold owners to sell development land with immediate vacant possession is restricted by lesser rights in the same land;
- Ownership assembly may be required for development;
- Owners may be willing to sell but not on terms acceptable to potential purchasers;
- Owners may be unwilling to sell.

In their study of 80 large redevelopment sites in four British cities, Adams *et al.* (2001) found that such ownership constraints disrupted plans to use, market, develop or purchase 64 of the sites between 1991 and 1995. Altogether, 146 individual ownership constraints, or 1.8 per site, were found. Divided ownership rights proved the most prevalent form of constraint. However, since most existing leases on potential redevelopment sites were of short-term duration, their impact was limited. The need for ownership assembly was the most disruptive type of constraint. Multiple ownership of land, in particular, proved hard to resolve without the prospect of lucrative commercial development and/or state acquisition or intervention. Neither NLUD nor SVDLS currently collect such sophisticated information on ownership constraints, which remain an unresolved policy problem. Their simple split between public and private ownership disguises the wide variation in ownership motives and behaviour within these sectors revealed by Adams *et al* (2001).

In the US, many studies have been carried out over the last decade to identify and prioritize the broad array of problems caused by brownfield land and the challenges facing their redevelopment. The most recent US Conference of Mayors study (2006) found that the main public-sector impediment (156 or 87% of cities) continues to be a lack of clean-up funds, followed by the challenges posed by carrying out environmental assessments (110 cities or 61 percent) and by liability issues (97 cities or 54 percent). These have been consistently identified as the top problems in the last five surveys carried out by that organization. That said, federal, state, and local initiatives have made tremendous headway in dealing with these problems. Nationwide, these approaches and the lessons learned from them culminated in a more formalized federal commitment to action

with the 2002 passage of the federal *Small Business Liability Relief and Brownfields Revitalization Act* (Public Law 107-118, H.R. 2869). This Act codified and expanded EPA's brownfield land programme, clarified and exempted some parties from Superfund liability, and authorized funding to, and limited EPA's Superfund enforcement authority at, sites cleaned up under a state programs.

In a 2000 study (De Sousa 2000), private-sector stakeholders involved in brownfield redevelopment in Ontario, Canada were asked to rank obstacles with respect to how they are perceived to affect brownfield project costs and risks. Those interviewed emphasized liability and regulatory mechanisms as the most severe obstacles because they add to project cost and duration. Moderate obstacles pertained mainly to policy (i.e. stringent remediation requirements, uncertainty regarding risk assessment), financing (i.e. lack of incentives, difficulties obtaining financing), and property perception factors. A recent study funded by the Canada Mortgage and Housing Corporation (2005) found that while redevelopment for housing faces the same barriers as those encountered by brownfield redevelopment in general, liability and regulatory barriers are perceived as being more significant because of the greater number of end users, which increases potential claimants and civil actions. Despite the increase in provincial and municipal efforts to deal with these issues, there has been little interest by the federal government to formulate a national policy on brownfield land.

Many of the supply and demand oriented constraints found in the UK are also present in the US and Canada: e.g. population growth rates in the brownfields-rich Northeast and Midwest are lower than those experienced in the west and south, economic development agencies hold on to land for potential reindustrialization, privately-owned and underused sites are 'mothballed' by landowners until they are willing to sell, and there are physical characteristics that pose challenges. Furthermore, suburban development is still significantly more attractive than urban brownfield land and only a few urban areas (e.g. Portland, Oregon, Minneapolis, Minnesota) have been willing to control urban sprawl through the implementation of growth boundaries. But these and other challenges have shifted over time as governments develop, implement, and tweak policies and programs to overcome them. This political commitment to action is occurring at all levels of government in the US, but is sporadic across Canada. A good example of this is the downgrading of liability by many private sector stakeholders in the US, owing to the implementation of better protection for those undertaking redevelopment. Indeed, a study by Simons *et al* (2003) found that among the 46 states with Voluntary Cleanup Programs, only 12 out of 11,497 closed environmental cases were reopened (a rate of 0.1% to 0.2%). As of mid-2007, nearly two-thirds of states also had some type of program in place to help finance the cleanup and reuse of brownfield land either directly or indirectly via tax incentives (23 states), direct financing (nearly half of the states), and other offsets to brownfield financing needs such as technical assistance, process facilitation, and project support (US EPA 2007b).

We can thus see how challenging the successful implementation of brownfield policy can be, especially as it demands serious engagement with the unknown, uncertain and uncontrollable. The temptation for policy-makers is to concentrate on relatively easy brownfield sites and ignore those that are more heavily constrained. Ironically, however, the very experience of tackling the more difficult sites is an essential component of policy maturity, for the feedback experience it generates provides policy-makers with a fully rounded experience of real challenge of brownfield development and enables more effective policies to be formulated. Moreover, there remains little evidence in any of the four countries studied that brownfield policy has progressed to a strategic rather than incremental attack on development constraints, necessary to inspire widespread confidence in brownfield land as a source of strategic profit, an issue we turn to in the next section.

STAGE 3: GENERATING ENGAGEMENT: PRIVATE-SECTOR KEENNESS ON BROWNFIELD REDEVELOPMENT

The **third** and final stage of policy maturity tests the capacity of government policy and actions to provoke a private-sector response. Our thesis here is that the maturing or flowering of brownfield policy becomes evident in the extent and nature of private sector engagement. In one sense, that is all about the application of private-sector investment to deliver what it would consider the right development product, at the right location and at the right time. However, if brownfield policy simply produces private-sector gains, then questions might legitimately be asked about its maturity. Thus, in a different sense, policy maturity is not simply about pulling in private investment but about doing so in a manner that supports and helps achieve public policy goals. In this section, therefore, we investigate the private sector's willingness to promote brownfield redevelopment.

The UK development industry has traditionally been divided between those firms that concentrate on commercial and industrial development and those that are primarily housebuilders. Over the years, much commercial and industrial development has taken place on previously developed land, particularly in city centres, where major development companies worked in partnership with local authorities to redevelop obsolete central areas. Since the early 1980s, successive urban regeneration policies have encourage commercial developers to turn their attention to the production of retail centres, business parks and new offices in run down former industrial areas, including waterfront locations. Adair *et al.* (2004) have produced extensive evidence to show how long-term investment returns from regeneration property exceed national and local benchmarks. As English Partnerships (2006) Urban Regeneration Index shows, urban regeneration areas have outperformed the market as a whole in office and industrial property and tracked it in retail.

Although housebuilding has turned its attention to brownfield redevelopment more recently, there is now substantial evidence to indicate a radical transformation over the past decade in the distribution of private residential output, at least in England. Research undertaken by Dixon et al. (2006) suggests that the largest English housebuilders were delivering between 50% and 74% of their output on brownfield land in 2004, while small and medium-sized housebuilders had also modified their business activities towards brownfield development. Since Dixon et al. calculate that brownfield sites accounted for 70% of the building plots with planning consents held in housebuilders' land banks, it would seem that government policy has induced a fundamental shift in the place of production, at least in the short to medium term. Adams (2004) contends that speculative housebuilders who enthusiastically build up core competencies in brownfield housing are likely to emerge as the market leaders of the future, while those who continue to rely on past practices and technologies will face an uncertain future as greenfield development opportunities begin to reduce. This point is confirmed in a detailed case study of the Berkeley Group by Karadimitriou (2005). He writes:

> "The leading PDL housebuilder in London, the Berkeley Group, was a 'first mover' and seems to have benefited substantially from this. Their ability to cope with the demands of PDL regeneration has ensured superior growth rates and converted them from an insignificant niche developer to an industry leader" (Karadimitriou, 2005, p. 283).

Yet, it remains unclear whether and to what extent the recent and significant switch in private housebuilding industry from greenfield towards brownfield locations represents an opportunity based business response to increased demand for more sustainable and centrally located homes rather than a mere reaction to policy pressure, which might be rapidly reversed if that policy were to be relaxed. In short, brownfield policy, at least in England, has yet to reach that stage of maturity where brownfield development is widely seen as well-entrenched source of strategic profit for the

private sector. This is also the case in many parts of the United States and Canada, outside the largest cities.

In both the United States and Canada, the private sector has shown a keen interest in brownfield redevelopment and has been pivotal in pushing the brownfield agenda forward, although there seems to be little hope of curbing the residential greenfield market. As in the UK, the development industry in the US and Canada is subdivided into those firms that concentrate on commercial and industrial development and those that are interested primarily in residential development. The first players in the urban brownfield market are typically well-established firms that specialize in higher density urban projects. As the brownfield market matures, however, firms involved in greenfield development participate in the brownfield market as well. Interviews with private sector stakeholders in Milwaukee and Chicago (De Sousa 2008) indicate that most of the factors attracting them to brownfield land relate primarily to location and surrounding amenities, and to a lesser extent to attributes associated with brownfield sites (i.e. the low price of land, lot size, availability of buildings for reuse, etc.).

Research carried out in Canada in the late 1990s reveals that private sector stakeholders are motivated primarily by economic factors such as maximizing return on investment, divesting liability risks/costs, acting on the growing popularity of downtown urban locations, and taking advantage of devalued brownfield property costs (De Sousa 2000). While the interviewees also identified environmental and social factors, these too were economically motivated - remediating a site to avoid any potential government intervention and protection of public health and safety to limit liability risks. As in the US, while there are efforts to promote more compact development in a few urban areas, there is little federal effort to curb greenfield development nationwide.

A real test of policy maturity for brownfield development is thus the extent to which it serves to change private sector behaviour. This is of course much easier to achieve in strong than weak property markets. A truly mature policy thus concentrates not so much on changing sites as changing markets. This requires clear integration between brownfield land policy and broader urban strategy, which demands a high level of innovation and learning among policy-makers. Returning thus to the concept of policy formulation as a dialectic, introduced in Figure 1 at the start of the paper, we would suggest policy maturity in brownfield development requires effective mechanisms by which policy-makers can draw on the 'bottom-up' experience of market operators working at an individual site level, and that they do so in way that policy begins to shape markets, rather than merely be shaped by them.

CONCLUSION

In the paper, we have sought to show how brownfield policy on both sides of the Atlantic has begun to mature, as policy makers have tried more fully to comprehend brownfield dimensions, to grasp how such a problem can be turned into an opportunity, and to reach out beyond the confines of the policy world to engage those with resources and expertise in the private sector, who might be best placed to make desired policy outcomes happen. We have sought to resist the temptation to portray our three stages towards policy maturity as inevitable or unproblematic, but instead to emphasis the challenges, pressures, interests and sheer events that make successful policy in this field often so hard to deliver. But in the end, these create the dialectic that enables policy to move forward, a step at a time, seeking but never achieving an ideal form.

Table 5: Summary of Comparative Analysis: Britain and North America					
		England	**Scotland**	**United States**	**Canada**
STAGE ONE: Grasping and understanding the problem	**Defining the term brownfield**	Previously developed land – opposite of greenfield	Previously developed land – opposite of greenfield	Known or potentially contaminated land	Known or potentially contaminated land with redevelopment potential
	Mapping its significance	About 5.5% of the total developed area of urban England brownfield & considered to have redevelopment potential in 2005	Difficult to tell, but over 7% of Glasgow, Scotland's most urbanised administrative area, vacant or derelict in 2006	Difficult to tell, but probably between 450,000 and 1 million brownfield sites across US (estimated 6% of city area)	Difficult to tell, but probably between 2,900 and 30,000 brownfield sites across Canada (estimated 3% of city area)
STAGE TWO: Recognising potential and securing commitment	**Policy importance**	Increasing importance, especially since 1998 for residential redevelopment	Residential development encouraged, but less important than in England	Increasing policy importance, especially for economic redevelopment	Geographically variable since only limited interest from federal government
	Main constraints	Brownfield land disproportionately concentrated in weaker property markets. Planning, physical and ownership constraints can also be problematic	Brownfield land disproportionately concentrated in weaker property markets. Planning, physical and ownership constraints can also be problematic	Cleanup cost, liability, and longer project duration due to environmental assessment and regulatory procedures. The concentration of brownfield land in weaker central-city markets in the Northeast and Midwest can also be problematic.	Liability, cleanup costs, complex regulatory requirements, and financing/funding issues.
STAGE THREE: Generating engagment	**Private sector interest**	Most private sector housebuilding now on brownfield land	Most private sector housebuilding now likely to be on brownfield land	Increasing interest by private developers in particular brownfield locations for all land uses, but focus of residential development remains on suburban growth	Emerging interest from private developers in stronger market locations particularly for residential reuse

Through this paper, we see the brownfield policy dialectic most clearly at particularly times and locations, such as in the refinement of brownfield definitions in both Britain and North America, in the articulation of brownfield land targets in England, and in the importance of experimental local pilot projects in the United States. We see less evidence of policy progression in the development of effective data systems, especially in North America, in the rather haphazard understanding of development constraints among policy-makers and especially in the embeddedness or otherwise of private sector commitment to brownfield redevelopment. In this context, there is reason to suspect that the current economic downturn will demonstrate the fragility of private-sector commitment to brownfield redevelopment to the extent that brownfield policy, even in England, has yet to mature to the stage where brownfield land is consistently seen as a source of strategic profit for the private sector.

Nevertheless, it is clear that this policy journey has now produced an active 'brownfield debate' on both sides of the Atlantic. Within that debate, important differences exist between England, Scotland, the United States and Canada, which we have sought to summarise in Table 5. Here, we are reminded that the term 'brownfield' is generally reserved for potentially contaminated land in North America in contrast to the broader concept of previously developed land employed in England and Scotland. In North America, the words 'greyfield' and vacant land have begun to be used to bridge this definitional gap, though to a limited degree. The overall significance of brownfield land is hard to determine, except in England where official stock figures relative to total land area are most detailed. Nevertheless, it is apparent that in all four countries, deindustrialisation in particular has ensured increasing prominence for brownfield issues in recent years. In the United States, economic redevelopment has been seen as the priority in contrast to the emphasis on residential redevelopment in England and to a lesser extent, in Scotland. Increasing private sector interest is now evident across all four countries, whilst weaker property markets and specific site constraints generally remain important obstacles to be overcome in bringing brownfield land forward for development.

What determines these differences and similarities between the four countries? Three main sets of influences are important here relating respectively to physical, cultural and institutional factors.

In physical terms, the sheer scale of contamination in the United States has ensured its importance to policy makers. Although contamination in England and Scotland has been significant enough to demand its own policy and legislative regime, other physical factors such as the outworn nature of the urban fabric and associated infrastructure in areas where brownfield land is concentrated have required a broader conceptualisation of the policy problem. This has been reinforced by service-sector and administrative restructuring, which has created large brownfield sites (such as former hospitals) with little or no contamination. The geographic concentration of brownfield land in a handful of Canadian urban areas with relatively strong property markets has resulted in limited federal action and a more tepid response from provincial governments.

Such physical differences are reinforced by cultural values and approaches in each country. North American concern to address deindustrialization and blight have helped concentrate government action on those sites in the worst condition (defined as potentially contaminated) and located in the most problematic areas, such as the cities of the Northeast and Midwest of the United States where brownfield land is often matched by high inner-city poverty and racial segregation. This, in turn, explains the emphasis on economic development and bringing employment and taxes back to ailing cities.

It could be argued that in England, and to a lesser extent in Scotland, the cultural motivation behind brownfield land policy is quite different and originates from a longstanding desire to

protect greenfield land and prevent urban sprawl. Interestingly, such environmental motives are now becoming more important in North American land policy, as seen in the recently introduced greenbelt legislation in the province of Ontario and the brownfield to green opportunities fund in British Columbia, Canada.

The most important differences, however, are institutional and are evident in an analysis of the varied roles of the public, private and voluntary sectors in the brownfield redevelopment process. In England, central government has been at the forefront of the brownfield agenda to a greater extent than the devolved government in Scotland and to a much greater extent that the federal administrations in North America. This is apparent in policy directions given to more local levels of government, in the provision of financial assistance and in the development of effective data systems. Yet even in North America, important contrasts are evident between the United States and Canada, with the federal level in the US playing a valuable role in setting the context for local action compared to Canada, where local initiative seems largely unfettered by institutional influence from the federal government. While federal disinterest in the brownfield agenda has thus been apparent in Canada, there is certainly greater evidence in the United States of federal policy and financial aid for those at the state and local levels who have demanded more support in combating urban deindustrialization and decay. Nevertheless, despite some early efforts by the Canadian federal government to track brownfield stocks, little investment has been made in effective national data systems in North America except in relation to more seriously contaminated lands.

In England especially, voluntary and environmental groups have an important impact on the evolution of urban land policy, which is perhaps best demonstrated by the powerful influence of CPRE (the Campaign for the Protection of Rural England) on national planning policy. Such action groups provide a critical connection between the psychological importance of the countryside in English literature, thinking and culture and the articulation of public policy on brownfield redevelopment. It has been argued that the relative weakness of such 'bottom-up' pressure in Scotland compared to England explains why brownfield land policy there has not really evolved beyond the stage of political interest and that without a stronger cultural antagonism to urban expansion, there will be little basis for the dialectic necessary to move from political interest to political will and commitment.

As English land policy has hardened in recent years towards an ever-stronger emphasis on brownfield re-use, so has the private sector in the form of speculative residential developers turning their attention from extensive greenfield estate development towards repairing the urban fabric through the extensive provision especially of new apartments on brownfield sites. Over half of all recent residential development in the UK (and possibly as much as 70%) has been constructed on brownfield sites. Such private sector interest in the implementation of public policy is evident also in the United States, where the original commitment of well-established residential developers specialising in high-density urban projects is increasingly complemented by the diversification of previously greenfield specialists. That said, suburban development is still the norm and expansion onto Greenfield land continues to proceed largely unchecked.

In a sense, then, this comparison of brownfield redevelopment in Britain and North America both reflects the specific physical, cultural and institutional context of each country and provides a point of entry through which the impact of those particular differences and similarities can be understood in a tangible way. The importance of this for researchers is apparent in the potential of the brownfield agenda on both sides of the Atlantic to act as an equally important vehicle to compare urban land policy and its evolution as those better-known agendas like urban sprawl and mega-projects.

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